



KONWERSATORIUM INSTYTUTU FIZYKI UMCS połączone z posiedzeniem POLSKIEGO TOWARZYSTWA FIZYCZNEGO

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„Plasmonic photovoltaics: relief induced transmittance, metal nanoparticles and nanowires on solar cell interface”

The process of excitation of surface plasmon polaritons in periodically corrugated metal or heavily doped semiconductor film (emitter) in heterostructure solar cells has been investigated theoretically. This process leads to the essential increase of light transmission into the photoactive semiconductor base. As a result, the efficiency enhancement of a surface barrier heterostructure of metal–semiconductor type, $\eta \propto J_{SC} \cdot V_{OC}$, has been predicted.

Due to light scattering by metal nanoparticles on solar cell interface, the averaged transmittance into photoactive base increases, and the solar cell efficiency enhances. Effect especially improves with nanoparticle size increase up to 100 nm (Au, Ag), when they are embedded into dielectric transition layer between metal and semiconductor.

Also, the transmittance enhancement is predicted for an periodic array of metal nanowires on semiconductor surface. This enhancement of photocurrent due to increase of the transparency in the far field (wave) zone is accompanied by decrease of light reflectance, instead of near-field zone where reflectance increase takes place.

Uprzejmie zapraszam wszystkich pracowników, doktorantów i studentów Instytutu Fizyki.

Zbigniew Korczak